

Appl. No. 09/649,528

Amtd. Dated 1 November 2004

Reply to Office action of 16 September 2004

AMENDMENTS TO THE CLAIMS

Please substitute the following claims for the respective claims previously existing in this application.

1. (Currently amended) A hydrogen generator comprising:

an inlet channel;

a vaporization zone receiving liquid fuel from the inlet channel;

a reaction zone including a reforming catalyst;

at least one vapor channel for transporting a vapor from the vaporization zone to the reaction zone;

an outlet channel for transporting hydrogen enriched gas out of the reaction zone; and

the inlet channel, the vaporization zone, the reaction zone, the at least one vapor channel,

and the outlet channel all comprising a fuel processor and all formed within an integral,
sintered, monolithic ceramic carrier.

~~a integral, sintered, monolithic ceramic carrier defining a fuel processor, the fuel processor including a vaporization zone and a reaction zone including a reforming catalyst;~~

~~at least one channel formed in the integral, sintered, monolithic ceramic carrier for transporting a liquid fuel to the vaporization zone;~~

~~at least one channel for transporting a vapor in the reaction zone;~~

~~an inlet channel for introducing the liquid fuel into the fuel processor; and~~

~~an outlet channel for transporting hydrogen enriched gas out of the fuel processor.~~

2. (Cancelled).

Appl. No. 09/649,528

Amdt. Dated 1 November 2004

Reply to Office action of 16 September 2004

3. (Previously presented) A hydrogen generator as claimed in claim 1 further including an integrated heat source formed within the integral, sintered, monolithic ceramic carrier and thermally coupled to the reaction zone and vaporization zone using thermally conductive channels or thermally conductive vias.

4. (Cancelled).

5. (Previously presented) A hydrogen generator as claimed in claim 3 wherein the integrated heat source is a chemical heater including a catalyst and arranged to oxidize fuel to produce heat.

6. (Original) A hydrogen generator as claimed in claim 5 wherein the chemical heater further includes an air inlet for providing oxygen for the oxidation of the fuel and the inlet channel includes an opening to provide fuel to the chemical heater.

7. (Previously presented) A hydrogen generator as claimed in claim 3 wherein the integrated heat source couples heat to the reaction zone using thermally conductive channels.

8. (Previously presented) A hydrogen generator as claimed in claim 1 wherein one of the vaporization zone and the reaction zone include a plurality of parallel channels.

9. (Cancelled).

Appl. No. 09/649,528

Amdt. Dated 1 November 2004

Reply to Office action of 16 September 2004

10. (Previously presented) A hydrogen generator as claimed in claim 1 wherein the integral, sintered, monolithic ceramic carrier is a monolithic three-dimensional multilayer ceramic structure.

11. (Currently amended) A hydrogen generator comprising:

a three-dimensional integral, sintered, monolithic multilayer ceramic carrier structure defining a fuel processor including a vaporization zone and a reaction zone including a reforming catalyst, at least one of the vaporization zone and the reaction zone including one of a plurality of parallel channels or at least one serpentine channel formed in the integral, sintered, monolithic multilayer ceramic carrier structure for transporting a liquid fuel to the vaporization zone and for transporting a vapor in the reaction zone, the integral, sintered, monolithic ceramic carrier structure further including an integrated heater thermally coupled to the reaction zone and the vaporization zone using thermally conductive channels or thermally conductive vias;

an inlet channel for introducing liquid fuel into the fuel processor; and

an outlet channel for transporting hydrogen enriched gas out of the fuel processor; and

the vaporization zone, the reaction zone, the inlet channel, and the outlet channel also formed within the integral, sintered, monolithic ceramic carrier.

12. (Cancelled).

Appl. No. 09/649,528

Amtd. Dated 1 November 2004

Reply to Office action of 16 September 2004

13. (Previously presented) A hydrogen generator as claimed in claim 11 wherein the integrated heater is one of a resistive heater that is electrically driven or a chemical heater including a catalyst and arranged to oxidize fuel to produce heat.
14. (Previously presented) A hydrogen generator as claimed in claim 13 wherein the integrated heater is a chemical heater and further includes an air port for providing oxygen for the oxidation of the fuel and the inlet channel includes an opening to provide fuel to the chemical heater.
15. (Previously presented) A hydrogen generator as claimed in claim 11 wherein the integrated heater couples heat to the reaction zone using thermally conductive channels.
16. (Previously presented) A hydrogen generator as claimed in claim 11 wherein one of the vaporization zone and the reaction zone include a plurality of parallel channels.
17. (Cancelled).

Appl. No. 09/649,528

Amtd. Dated 1 November 2004

Reply to Office action of 16 September 2004

18. (Currently amended) A hydrogen generator comprising:

a three-dimensional, integral, sintered, monolithic multilayer ceramic carrier structure defining a fuel processor including a vaporization zone and a reaction zone including a reforming catalyst, at least one of the vaporization zone and the reaction zone including one of a plurality of parallel channels or at least one serpentine channel, the three-dimensional, integral, sintered, monolithic ceramic carrier structure further including an integrated heater thermally coupled to the reaction zone and the vaporization zone using thermally conductive structures;

an inlet channel for introducing liquid fuel into the fuel processor; and

an outlet channel for transporting hydrogen enriched gas out of the fuel processor; and

the vaporization zone, the reaction zone, the one of a plurality of parallel channels or at least one serpentine channel, the inlet channel, and the outlet channel also formed within the integral, sintered, monolithic ceramic carrier.

19. (Cancelled).

20. (Original) A hydrogen generator as claimed in claim 18 wherein the integrated heater is one of a resistive heater that is electrically driven or a chemical heater including a catalyst and arranged to oxidize fuel to produce heat.

Appl. No. 09/649,528

Amtd. Dated 1 November 2004

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21. (Previously presented) A hydrogen generator as claimed in claim 20 wherein the integrated heater is a chemical heater and further includes an air port for providing oxygen for the oxidation of the fuel and the inlet channel includes an opening to provide fuel to the chemical heater.